

Amendments to Claims

Please cancel claims 1-19 and 49-87 without prejudice. This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims

1-19. (canceled)

20. (original) A system for controlling the pitch of a controllable pitch marine propeller of a watercraft having an engine, comprising:

a drive actuator for manual movement by a watercraft operator of the watercraft; a controller for controlling engine power and pitch of the marine propeller;

a mode selector for selecting a cruise mode or a manoeuvring mode for the watercraft; and

wherein the controller is also for receiving control signals from the mode selector and from the drive actuator, and when the mode selector is actuated to place the watercraft in the manoeuvring mode, the controller limits engine rpm speed to within a predetermined value less than maximum engine speed and controls the pitch of the propeller blades in accordance with the manual movement of the drive actuator by the watercraft operator to change watercraft speed, and when the mode selector is in the cruise mode, the controller sets engine power up to the maximum engine speed and propeller pitch in accordance with movement of the drive actuator by the watercraft operator to change watercraft speed.

21. (original) The system of claim 20 wherein the controller when in the manoeuvring mode maintains engine speed substantially constant at a speed equal to or less than the said predetermined limit.

22. (original) The system of claim 20 wherein the controller when in the manoeuvring mode adjusts the engine speed whilst also adjusting the pitch of the propeller.

23. (original) The system of claim 20 wherein the predetermined limit is about 30% of maximum engine speed.

24. (original) The system of claim 20 wherein the controller comprises a pitch control unit which controls engine power by selecting an output for supply to the engine from a look up table dependent upon the manually adjusted position of the drive actuator, and a pitch motor controller for receiving outputs from the pitch control unit to adjust the pitch of the propeller.
25. (original) The system of claim 20 the system includes a pitch control motor for adjusting the pitch of the propeller and the pitch motor controller is for supplying an output signal to the pitch control motor to actuate the pitch control motor to adjust the propeller to the desired pitch.
26. (original) The system of claim 21 wherein the system includes a sensor for providing a measure of the pitch of the propeller blades, the sensor being coupled to the pitch control unit so the pitch control unit is provided with a signal indicative of the pitch of the propeller.
27. (original) The system of claim 20 wherein the watercraft includes a clutch for selectively disconnecting power from the engine to the propeller or enabling power to be supplied from the engine to the propeller, a clutch actuator connected to the clutch and the pitch control unit being for supplying a control signal to the actuator to open or close the clutch.
28. (original) The system of claim 27 wherein the system includes a clutch position monitoring sensor for providing a signal indicative of whether the clutch is in the open or closed position, the sensor being connected to the pitch control unit.
29. (original) The system of claim 25 wherein the engine includes an rpm sensor for sensing engine speed, the rpm sensor being connected to the pitch control unit.
30. (original) The system of claim 29 wherein a speed measuring device is provided and connected to the pitch control unit for supplying a signal indicative of the speed of the watercraft to the pitch control unit.

31. (original) The system of claim 20 wherein the controller determines watercraft speed from a look-up table so that for particular pitch amounts and propeller rotation speeds, an appropriate speed value is provided.

32. (original) The system of claim 31 wherein the watercraft speed is approximated from the equation: speed = pitch amount x propeller rotation speed - slip.

33. (original) The system of claim 30 wherein the speed measuring device is a GPS speed measuring system.

34. (original) The system of claim 20 wherein the mode selector comprises at least one switch for selectively placing the watercraft into the manoeuvring mode or the cruise mode.

35. (original) The system of claim 34 wherein a second switch is provided for placing the watercraft into a pitch check mode or an engine check mode.

36. (original) The system of claim 35 wherein the switches are momentary contact switches to place the system in the cruise mode or manoeuvring mode, and the pitch check mode or engine check mode by causing modes to toggle between the cruise mode and manoeuvring mode, and pitch check mode and engine mode.

37. (currently amended) The system of claim 20 wherein the system includes a clutch engage actuator for actuation by the watercraft operator so the pitch control unit can be overridden if attempting to open the clutch to maintain the clutch in a closed position so power is delivered from the engine to the propeller.

38. (original) The system of claim 20 wherein the system includes a propeller stop element for actuation by the watercraft operator to perform an emergency stop of the propeller, the propeller stop element being connected to the pitch control unit so that upon actuation of the propeller stop element, the pitch control unit reduces engine speed and opens the clutch to shut off rotary power from the engine to the propeller, and adjust the position of the propeller to neutral position.

39. (original) The system of claim 21 wherein the pitch control unit, when the pitch check-engine check mode switch is actuated, causes the clutch to open so that drive is not

supplied from the engine to the propeller and in the engine check mode position, the pitch control unit outputs a signal to the engine to cause the engine to rev in accordance with the position of the drive actuator, as controlled by the watercraft operator, and when in the pitch check mode position, causes a signal to be output to the pitch motor controller and then to the pitch motor to adjust the pitch of the propeller dependent on the movement of the drive actuator.

40. (original) The system of claim 39 wherein the pitch control unit includes a look up table of values for output to the pitch motor controller dependent upon the position of the drive actuator so that an appropriate value is selected for supply to the pitch motor controller to in turn control the pitch motor to adjust the pitch of a propeller to a position dependent on the position of the drive actuator.

41. (original) The system of claim 20 wherein the drive actuator is a control lever moveable between a full forward position to a full reverse position.

42. (original) A method of controlling the pitch of a controllable pitch marine propeller of a watercraft which has an engine, comprising the steps of:

providing a cruise mode in which engine power and propeller pitch position is adjusted by manual operation of a drive actuator so the engine power is increased or decreased to drive the watercraft by rotation of the propeller and adjusting of the pitch of the propeller to achieve a required watercraft speed, the engine speed being adjustable up to a maximum engine speed;

providing a manoeuvring mode in which engine speed is limited to less than the maximum engine speed and propeller pitch is adjusted by manual control of a drive actuator by the watercraft operator to enable the boat to be manoeuvred by pitch control of the propeller which varies the speed of the watercraft; and

providing a transition mode so that when the mode is changed from the cruise mode to the manoeuvring mode, or from the manoeuvring mode to the cruise mode, engine speed and propeller pitch are not changed in an undesirable fashion upon change between the modes if the location of the manually controlled drive actuator is in such a position which would otherwise cause the watercraft to respond in an undesirable manner.

43. (original) The method of claim 42 wherein a single drive actuator is provided for changing watercraft speed when in the cruise mode, and changing propeller pitch when in the manoeuvring mode.

44. (original) The method of claim 42 wherein the transition mode determines whether the drive actuator position is beyond a predetermined limit and sets a predetermined engine speed and adjusts the pitch of the propeller dependent upon watercraft speed.

45. (original) The method of claim 42 wherein the transmission mode still further comprises preventing the watercraft from operating in manoeuvring mode and in such time as the drive actuator is manually adjusted by the watercraft operator to a position which matches engine speed and pitch of the propeller and thereafter continued movement of the drive actuator enables the watercraft operator to drive the watercraft in cruise mode by movement of the drive actuator.

46. (original) The method of claim 42 wherein the step of providing the manoeuvring mode maintains engine speed substantially constant at a speed equal to or less than the said predetermined limit.

47. (original) The method of claim 42 wherein the step of providing the manoeuvring mode comprises adjusting the engine speed whilst also adjusting the pitch of the propeller.

48. (original) The method of claim 42 wherein the predetermined limit is about 30% of maximum engine speed.

49-87. (canceled)